

SECTION 4  
NEW CLAIMS

Reh 1.12.22. 23.

A lighting device including:  
a light source;  
a source of electrical power;  
said light source further including a light emitting diode element;  
said light emitting diode element coincident with a reference axis;  
a connecting means for connecting said source of electrical power to said light source;  
said light emitting diode element emitting a side light diverging about said reference axis;  
a refractive means;  
a reflective means, comprising a reflective surface connected to said light source intersecting said side light, for reflecting said side light and forming a reflected light;  
said reflected light converging about said reference axis;  
said reflective surface comprising a rotary surface of a curved line about said reference axis; and  
said refractive means, comprising a refractive surface connected to said reflective surface intersecting said reflected light, for refracting said reflected light and bringing said reflected light towards parallelism with said reference axis.

Reh 1.12.22. 24.

A lighting device including:  
a light source;  
a source of electrical power;  
said light source further including a light emitting diode element;  
said light emitting diode element coincident with a reference axis;  
said reference axis coincident with a reference plane;  
a connecting means for connecting said source of electrical power to said light source;  
said light emitting diode element emitting a first side

light diverging about a first side of said reference plane, said first side light diverging about said reference axis;

a refractive means;

a reflective means, comprising a first reflective surface connected to said light source intersecting said first side light, for reflecting said first side light and forming a first reflected light;

said first reflected light converging about said reference axis;

said first reflective surface comprising a rotary surface of a curved line about said reference axis; and

said light emitting diode element further emitting a second side light diverging about a second side of said reference plane, said second side light diverging about said reference axis;

said reflective means, further comprising a second reflective surface intersecting said second side light, for reflecting said second side light and forming a second reflected light;

said second reflected light converging about said reference axis;

said second reflective surface comprising a rotary surface of a curved line about said reference axis; and

said refractive means, connected to said first reflective surface intersecting said first reflected light, for refracting said first reflected light and bringing said first reflected light towards parallelism with said reference axis, said refractive means further connected to said second reflective surface intersecting said second reflected light, for refracting said second reflected light and bringing said second reflected light towards parallelism with said reference axis.

24. A lighting device including:

a light source;

a source of electrical power;

said light source further including a light emitting diode element;

said light emitting diode element coincident with a refer-

said light source further including a light emitting diode element;

said light emitting diode element coincident with a reference axis;

said light emitting diode element encapsulated in a lamp light transmitting medium, said lamp light transmitting medium comprising a resin having an index of refraction exceeding 1.1;

a connecting means for connecting said source of electrical power to said light source;

said light emitting diode element emitting a side light diverging about said reference axis;

a refractive means;

a reflective means, comprising a reflective surface connected to said light source intersecting said side light, for reflecting said side light and forming a reflected light;

said reflected light converging about said reference axis;

said reflective surface comprising a rotary surface of a curved line about said reference axis; and

said refractive means, comprising a refractive surface connected to said reflective surface intersecting said reflected light, for refracting said reflected light and bringing said reflected light towards parallelism with said reference axis.

25. A lighting device including:

a light source;

a source of electrical power;

said light source further including a light emitting diode element;

said light emitting diode element coincident with a reference axis;

a connecting means for connecting said source of electrical power to said light source;

said light emitting diode element emitting a side light diverging about said reference axis;

said light emitting diode element encapsulated in a lamp light transmitting medium, said lamp light transmitting medium

comprising a resin having an index of refraction exceeding 1.1;  
 a refractive means;  
 a reflective means;  
 said reflective means and said refractive means formed of  
 said lamp light transmitting medium;  
 said reflective means, comprising a reflective surface  
 connected to said light source intersecting said side light, for  
 reflecting said side light and forming a reflected light;  
 said reflected light converging about said reference axis;  
 said reflective surface comprising a rotary surface of a  
 curved line about said reference axis; and  
 said refractive means, comprising a refractive surface  
 connected to said reflective surface intersecting said reflected  
 light, for refracting said reflected light and bringing said  
 reflected light towards parallelism with said reference axis.

26. A lighting device including:  
 a light source;  
 a source of electrical power;  
 said light source further including a light emitting diode  
 element;  
 said light emitting diode element coincident with a refer-  
 ence axis;  
 said light emitting diode element encapsulated in a lamp  
 light transmitting medium, said lamp light transmitting medium  
 comprising a resin having an index of refraction exceeding 1.1;  
 a connecting means for connecting said source of electrical  
 power to said light source;  
 said light emitting diode element emitting a side light  
 having a divergence about said reference axis;  
 a refractive means;  
 a reflective means, comprising a reflective surface connect-  
 ed to said light source intersecting said side light, for re-  
 flecting said side light and forming a reflected light;  
 said reflected light converging about said reference axis;  
 said reflective surface comprising a a rotary surface of a

curved line about said reference axis;

said refractive means, comprising a refractive surface connected to said reflective surface intersecting said reflected light, for refracting said reflected light and bringing said reflected light towards parallelism with said reference axis;

said light emitting diode element additionally emitting a forward light having a divergence about said reference axis;

said divergence of said side light about said reference axis larger than said divergence of said forward light about said reference axis; and

a lens means, formed of said lamp light transmitting medium and disposed about said reference axis and said light emitting diode element intersecting said forward light, for refracting and bringing said forward light towards parallelism with said reference axis.

27. A lighting device including:

a light source;

a source of electrical power;

said light source further including a light emitting diode element;

said light emitting diode element coincident with a reference axis;

said light emitting diode element encapsulated in a lamp light transmitting medium, said lamp light transmitting medium comprising a resin having an index of refraction exceeding 1.1;

a connecting means for connecting said source of electrical power to said light source;

said light emitting diode element emitting a side light diverging about said reference axis;

a refractive means;

a reflective means, comprising a reflective surface connected to said light source intersecting said side light, for reflecting said side light and forming a reflected light;

said reflected light converging about said reference axis;

said reflective surface comprising a rotary surface of a

curved line about said reference axis, and

said refractive means, comprising a refractive surface connected to said reflective surface intersecting said reflected light, for refracting said reflected light and bringing said reflected light towards parallelism with said reference axis;

a sleeve means formed of a sleeve light transmitting medium, and

said sleeve means comprising said refractive means and said reflective means, said sleeve means further comprising a wall forming a hollow portion, said hollow portion receiving said light source.

28. The lighting device according to any of claims 24 thru 26 which further includes:

a sleeve means formed of a sleeve light transmitting medium coupled to said light source, for forming said refractive means and said reflective means, said sleeve means further comprising a wall forming a hollow portion, said hollow portion receiving said light source, a sleeve light transmitting medium with an index of refraction substantially equal to said index of refraction of said lamp medium.

29. The lighting device according to any of claims 22 thru 26 which further includes:

a sleeve means formed of a sleeve light transmitting medium coupled to said light source, for forming said refractive means and said reflective means, said sleeve means further comprising a wall forming a hollow portion, said hollow portion receiving said light source.

30. The lighting device according to any of claims 22, 23, 24, 25 or 27 which further includes:

a lens means;

said light emitting diode element further emitting a forward light diverging about said reference axis at a first angle;

said side light additionally diverging about said reference axis at a second angle;

said second angle larger than said first angle;

said lens means, connected to said light source and disposed about said reference axis intersecting said forward light, for refracting said forward light and bringing said forward light towards parallelism with said reference axis.

31. The lighting device according to any of claims 22, 23, 24 or 25 which further includes:

said light emitting diode element further emitting a forward light diverging about said reference axis at a first angle;

said side light additionally diverging about said reference axis at a second angle;

said second angle larger than said first angle;

a lens means, coupled to said light source and disposed about said reference axis intersecting said forward light, for refracting said forward light and reducing bringing said forward light towards parallelism with said reference axis;

a sleeve means;

a sleeve means, of a sleeve light transmitting medium coupled to said light source, for forming said refractive means and said reflective means, said sleeve means further comprising a wall forming a hollow portion, said hollow portion receiving said light source; and

a wall light transmitting medium with an index of refraction exceeding 1.1 between said wall and said light source.

32. The lighting device according to any of claims 22, 23, 24, 25 or 27 which further includes:

a lens means;

said light emitting diode element further emitting a forward light diverging about said reference axis at a first angle;

said side light additionally diverging about said reference axis at a second angle;

said second angle larger than said first angle;

said lens means, connected to said light source and disposed about said reference axis intersecting said forward light for refracting said forward light and bringing said forward light towards parallelism with said reference axis; and

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said lens means having a focal point substantially at said light emitting diode element.

33. The lighting device according to any of claims 22, 24, 25, 26 or 27 which further includes:

34. A lighting device according to any of claims 22, 24, 25, 26 or 27 which further includes:

said refractive surface formed of a rotary movement of a line about said reference axis, said line approximately intersecting said reference axis forming an acute angle.

35. A lighting device according to any of claims 22, 24, 25, 26 or 27 which further includes:

said refractive surface formed of a rotary movement of a curved line about said reference axis.

36. A lighting device according to any of claims 22, 24, 25, 26 or 27 which further includes:

said reflective means additionally comprising a reflective coating on said reflective surface.



ence axis;

said light emitting diode element encapsulated in a lamp light transmitting medium, said lamp light transmitting medium comprising a resin having an index of refraction exceeding 1.1;

a connecting means for connecting said source of electrical power to said light source;

said light emitting diode element emitting a side light diverging about said reference axis;

a refractive means;

a reflective means, comprising a reflective surface connected to said light source intersecting said side light, for reflecting said side light and forming a reflected light;

said reflected light converging about said reference axis;

said reflective surface comprising a rotary surface of a curved line about said reference axis; and

said refractive means, comprising a refractive surface connected to said reflective surface intersecting said reflected light, for refracting said reflected light and bringing said reflected light towards parallelism with said reference axis.

25. A lighting device including:

a light source;

a source of electrical power;

said light source further including a light emitting diode element;

said light emitting diode element coincident with a reference axis;

a connecting means for connecting said source of electrical power to said light source;

said light emitting diode element emitting a side light diverging about said reference axis;

said light emitting diode element encapsulated in a lamp light transmitting medium, said lamp light transmitting medium comprising a resin having an index of refraction exceeding 1.1;

a refractive means;

a reflective means;

said reflective means and said refractive means formed of said lamp light transmitting medium;

said reflective means, comprising a reflective surface connected to said light source intersecting said side light, for reflecting said side light and forming a reflected light;

said reflected light converging about said reference axis;

said reflective surface comprising a rotary surface of a curved line about said reference axis; and

said refractive means, comprising a refractive surface connected to said reflective surface intersecting said reflected light, for refracting said reflected light and bringing said reflected light towards parallelism with said reference axis.

26. A lighting device including:

a light source;

a source of electrical power;

said light source further including a light emitting diode element;

said light emitting diode element coincident with a reference axis;

said light emitting diode element encapsulated in a lamp light transmitting medium, said lamp light transmitting medium comprising a resin having an index of refraction exceeding 1.1;

a connecting means for connecting said source of electrical power to said light source;

said light emitting diode element emitting a side light having a divergence about said reference axis;

a refractive means;

a reflective means, comprising a reflective surface connected to said light source intersecting said side light, for reflecting said side light and forming a reflected light;

said reflected light converging about said reference axis;

said reflective surface comprising a rotary surface of a curved line about said reference axis;

said refractive means, comprising a refractive surface connected to said reflective surface intersecting said reflected

light, for refracting said reflected light and bringing said reflected light towards parallelism with said reference axis;

said light emitting diode element additionally emitting a forward light having a divergence about said reference axis;

said divergence of said side light about said reference axis larger than said divergence of said forward light about said reference axis; and

a lens means, formed of said lamp light transmitting medium and disposed about said reference axis and said light emitting diode element intersecting said forward light, for refracting and bringing said forward light towards parallelism with said reference axis.

27. A lighting device including:

a light source;

a source of electrical power;

said light source further including a light emitting diode element;

said light emitting diode element coincident with a reference axis;

said light emitting diode element encapsulated in a lamp light transmitting medium, said lamp light transmitting medium comprising a resin having an index of refraction exceeding 1.1;

a connecting means for connecting said source of electrical power to said light source;

said light emitting diode element emitting a side light diverging about said reference axis;

a refractive means;

a reflective means, comprising a reflective surface connected to said light source intersecting said side light, for reflecting said side light and forming a reflected light;

said reflected light converging about said reference axis;

said reflective surface comprising a rotary surface of a curved line about said reference axis; and

said refractive means, comprising a refractive surface connected to said reflective surface intersecting said reflected

light, for refracting said reflected light and bringing said reflected light towards parallelism with said reference axis;

a sleeve means formed of a sleeve light transmitting medium;  
and

said sleeve means comprising said refractive means and said reflective means, said sleeve means further comprising a wall forming a hollow portion, said hollow portion receiving said light source.

28. The lighting device according to any of claims 24 thru 26 which further includes:

a sleeve means formed of a sleeve light transmitting medium coupled to said light source, for forming said refractive means and said reflective means, said sleeve means further comprising a wall forming a hollow portion, said hollow portion receiving said light source, a sleeve light transmitting medium with an index of refraction substantially equal to said index of refraction of said lamp medium.

29. The lighting device according to any of claims 22 thru 26 which further includes:

a sleeve means formed of a sleeve light transmitting medium coupled to said light source, for forming said refractive means and said reflective means, said sleeve means further comprising a wall forming a hollow portion, said hollow portion receiving said light source.

30. The lighting device according to any of claims 22, 23, 24, 25 or 27 which further includes:

a lens means;

said light emitting diode element further emitting a forward light diverging about said reference axis at a first angle;

said side light additionally diverging about said reference axis at a second angle;

said second angle larger than said first angle;

said lens means, connected to said light source and disposed about said reference axis intersecting said forward light, for refracting said forward light and bringing said forward light

towards parallelism with said reference axis.

31. The lighting device according to any of claims 22, 23, 24 or 25 which further includes:

said light emitting diode element further emitting a forward light diverging about said reference axis at a first angle;

said side light additionally diverging about said reference axis at a second angle;

said second angle larger than said first angle;

a lens means, coupled to said light source and disposed about said reference axis intersecting said forward light, for refracting said forward light and reducing bringing said forward light towards parallelism with said reference axis;

a sleeve means;

a sleeve means, of a sleeve light transmitting medium coupled to said light source, for forming said refractive means and said reflective means, said sleeve means further comprising a wall forming a hollow portion, said hollow portion receiving said light source; and

a wall light transmitting medium with an index of refraction exceeding 1.1 between said wall and said light source.

32. The lighting device according to any of claims 22, 23, 24, 25 or 27 which further includes:

a lens means;

said light emitting diode element further emitting a forward light diverging about said reference axis at a first angle;

said side light additionally diverging about said reference axis at a second angle;

said second angle larger than said first angle;

said lens means, connected to said light source and disposed about said reference axis intersecting said forward light for refracting said forward light and bringing said forward light towards parallelism with said reference axis; and

said lens means having a focal point substantially at said light emitting diode element.

33. The lighting device according to any of claims 22, 24, 25,

26 or 27 which further includes:

said refractive means additionally for bringing said reflected light approximately to parallelism.

34. A lighting device according to any of claims 22, 24, 25, 26 or 27 which further includes:

said refractive surface formed of a rotary movement of a line about said reference axis, said line approximately intersecting said reference axis forming an acute angle.

35. A lighting device according to any of claims 22, 24, 25, 26 or 27 which further includes:

said refractive surface formed of a rotary movement of a curved line about said reference axis.

36. A lighting device according to any of claims 22, 24, 25, 26 or 27 which further includes:

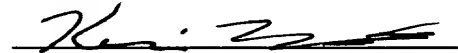
said reflective means additionally comprising a reflective coating on said reflective surface.

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It appears that all matters have been addressed satisfactorily, and that the case is now in condition for a complete allowance; and the same is respectfully urged.

However, if the Examiner believes otherwise, or has any comments or questions, or has any suggestions for putting the case in condition for final allowance, he is respectfully urged to contact the undersigned at the telephone number below, so that any expeditious resolutions may be effected and the case passed to issue promptly.

Respectfully submitted,



KEVIN MCDERMOTT, INVENTOR  
PH. 410-775-7122

P.S.

1. please date, stamp and return the enclosed postcard.
2. A request for a three month extension for a response and a check for that extension is enclosed.
3. An updated disclosure statement is enclosed.

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By: Teresa L. Nichols